

# REDLINE VERSION



---

## Explosive atmospheres – Part 1: Equipment protection by flameproof enclosures "d"

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

---

ICS 29.260.20

ISBN 978-2-8322-1850-1

**Warning! Make sure that you obtained this publication from an authorized distributor.**

INTERNATIONAL ELECTROTECHNICAL COMMISSION

---

**IEC 60079-1**  
Edition 7.0 2014-06

**EXPLOSIVE ATMOSPHERES –**

**Part 1: Equipment protection by flameproof enclosures "d"**

**INTERPRETATION SHEET 1**

This interpretation sheet has been prepared by IEC technical committee 31: Equipment for explosive atmospheres.

The text of this interpretation sheet is based on the following documents:

DISH	Report on voting
31/1536/DISH	31/1542/RVDISH

Full information on the voting for the approval of this interpretation sheet can be found in the report on voting indicated in the above table.

---

**IEC 60079-1:2014 Edition 7.0, Explosive atmospheres – Part 1: Equipment protection by flameproof enclosures "d"**

**Question 1:**

The requirements given in 13.1 of IEC 60079-1:2014 (Edition 7) restrict threaded entries for flameproof enclosures to only metric and NPT. Does this restriction represent a major technical change between IEC 60079-1:2014 (Edition 7) and IEC 60079-1:2007 (Edition 6)?

**Answer 1:**

Yes, the restriction to only metric and NPT regarding threaded entries for flameproof enclosures does represent a major technical change between IEC 60079-1:2014 (Edition 7) and IEC 60079-1:2007 (Edition 6). The requirements given in Clause 13 of IEC 60079-1:2007 (Edition 6) had no such normative restriction, with reference to metric and NPT only as examples of threaded entries for flameproof enclosures.

While IEC 60079-1:2014 (Edition 7) only permits the use of metric and NPT threads for entry into flameproof enclosures, cable glands/conduit entry devices, thread adapters and blanking elements are permitted to use other thread forms (see Annex C of IEC 60079-1:2014 (Edition 7)).

NOTE 1 The intention of the restriction to only metric and NPT regarding threaded entries for flameproof enclosures is to minimize the mismatch of thread forms in enclosure entries.

NOTE 2 In the Foreword of IEC 60079-1:2014 (Edition 7), the table detailing the significance of the changes between IEC 60079-1:2014 (Edition 7) and IEC 60079-1:2007 (Edition 6) mistakenly did not identify this metric and NPT restriction as a major technical change. Unfortunately, the IEC Directives do not permit a corrigendum to be issued to correct errors in non-normative text such as the table detailing the significance of changes.

**Question 2:**

Where a thread adapter is fitted and assessed as a factory-assembled part of the flameproof enclosure, what are the permitted thread forms?

**Answer 2:**

A thread adapter may use thread forms other than metric and NPT, whether as an Ex Equipment thread adapter or as a thread adapter fitted and assessed as a factory-assembled part of the flameproof enclosure (see Annex C of IEC 60079-1:2014 (Edition 7)).

**Question 3:**

Can a blanking element be installed in a thread adapter which is fitted and assessed as a factory-assembled part of the flameproof enclosure?

**Answer 3:**

Yes, the requirements given in Clause 13 of IEC 60079-1:2014 (Edition 7) regarding thread adapters are for separately certified Ex equipment thread adapters, not those fitted and assessed as a factory-assembled part of the flameproof enclosure.

**Question 4:**

What is the required marking when a thread adapter is fitted and assessed as a factory-assembled part of the flameproof enclosure?

**Answer 4:**

Clause 13 of IEC 60079-1:2014 (Edition 7) requires identification of the specific thread type and size of threaded entries into flameproof enclosures. In the case where the thread adapter is fitted and assessed as a factory-assembled part of the flameproof enclosure, the requirement for identification applies to the thread form of the adapter for the field wiring connection.

## CONTENTS

CONTENTS.....	2
FOREWORD.....	8
1 Scope.....	16
2 Normative references.....	16
3 Terms and definitions .....	17
<b>4 Level of protection (equipment protection level, EPL) .....</b>	<b>20</b>
<b>4.1 General.....</b>	<b>20</b>
<b>4.2 Requirements for level of protection “da” .....</b>	<b>20</b>
<b>4.3 Requirements for level of protection “db” .....</b>	<b>20</b>
<b>4.4 Requirements for level of protection “dc”.....</b>	<b>20</b>
<b>4.4.1 General .....</b>	<b>20</b>
<b>4.4.2 Construction of “dc” devices .....</b>	<b>21</b>
<b>4.4.3 Tests for “dc” devices.....</b>	<b>21</b>
5 Flameproof joints .....	21
5.1 General requirements.....	21
5.2 Non-threaded joints .....	22
5.2.1 Width of joints ( <i>L</i> ).....	22
5.2.2 Gap ( <i>i</i> ).....	23
5.2.3 Spigot joints.....	23
5.2.4 Holes in joint surfaces.....	24
5.2.5 Conical joints .....	26
5.2.6 Joints with partial cylindrical surfaces (not permitted for Group IIC).....	26
5.2.7 Flanged joints for acetylene atmospheres .....	27
5.2.8 Serrated joints .....	27
<b>5.2.9 Multi-step joints.....</b>	<b>28</b>
5.3 Threaded joints .....	30
5.4 Gaskets (including O-rings) .....	31
5.5 Equipment using capillaries .....	33
<b>6 Sealed joints .....</b>	<b>33</b>
6.1 Cemented joints .....	33
6.1.1 General .....	33
6.1.2 Mechanical strength .....	33
6.1.3 Width of cemented joints .....	34
<b>6.2 Fused glass joints .....</b>	<b>34</b>
<b>6.2.1 General .....</b>	<b>34</b>
<b>6.2.2 Width of fused glass joints.....</b>	<b>34</b>
7 Operating rods.....	35
8 Supplementary requirements for shafts and bearings.....	35
8.1 Joints of shafts.....	35
<b>8.1.1 General .....</b>	<b>35</b>
8.1.2 Cylindrical joints.....	35
8.1.3 Labyrinth joints .....	35
8.1.4 Joints with floating glands .....	35

8.2	Bearings .....	37
8.2.1	Sleeve bearings .....	37
8.2.2	Rolling-element bearings .....	37
9	Light-transmitting parts .....	37
10	Breathing and draining devices which form part of a flameproof enclosure .....	38
10.1	<b>General</b> .....	38
10.2	Openings for breathing or draining .....	38
10.3	Composition limits .....	38
10.4	Dimensions .....	38
10.5	Elements with measurable paths .....	38
10.6	Elements with non-measurable paths .....	38
10.7	Removable devices .....	39
10.7.1	<b>General</b> .....	39
10.7.2	Mounting arrangements of the elements .....	39
10.8	Mechanical strength .....	39
10.9	Breathing devices and draining devices when used as Ex components .....	39
10.9.1	<b>General</b> .....	39
10.9.2	Mounting arrangements of the elements and components .....	39
10.9.3	Type tests for breathing and draining devices used as Ex components .....	40
10.9.4	Ex component certificate .....	43
11	Fasteners <del>and associated holes and blanking elements and openings</del> .....	43
12	Materials <del>and mechanical strength of enclosures</del> <del>Materials inside the enclosures</del> .....	46
13	Entries for flameproof enclosures .....	47
13.1	<b>General</b> .....	47
13.2	<b>Threaded holes</b> .....	47
13.3	<b>Non-threaded holes (for Group I only)</b> .....	47
13.4	Cable glands .....	48
13.5	Conduit sealing devices .....	48
13.6	Plugs and sockets and cable couplers .....	49
13.7	Bushings .....	50
13.8	<b>Blanking elements</b> .....	50
14	Verification and tests .....	50
15	Type tests .....	51
15.1	<b>General</b> .....	51
15.2	Tests of ability of the enclosure to withstand pressure .....	52
15.2.1	General .....	52
15.2.2	Determination of explosion pressure (reference pressure) .....	52
15.2.3	Overpressure test .....	55
15.3	Test for non-transmission of an internal ignition .....	56
15.3.1	<b>General</b> .....	56
15.3.2	Electrical equipment of Groups I, IIA and IIB .....	58
15.3.3	Electrical equipment of Group IIC .....	59
15.4	Tests of flameproof enclosures with breathing and draining devices .....	61
15.4.1	<b>General</b> .....	61
15.4.2	Tests of ability of the enclosure to withstand pressure .....	61
15.4.3	Thermal tests .....	61
15.4.4	Test for non-transmission of an internal ignition .....	62

15.5	Tests for “dc” devices .....	63
15.5.1	General .....	63
15.5.2	Preparation of “dc” samples .....	63
15.5.3	Test conditions for “dc” devices .....	63
16	Routine tests .....	63
16.1	General.....	63
16.2	Enclosures not incorporating a welded construction .....	64
16.3	Enclosures incorporating a welded construction .....	65
16.4	Bushings not specific to one flameproof enclosure .....	65
16.5	Acceptance criteria .....	65
16.6	Batch testing.....	65
17	Switchgear for Group I.....	65
17.1	General.....	65
17.2	Means of isolation .....	66
17.2.1	General .....	66
17.3	Doors or covers.....	66
17.3.1	Quick-acting doors or covers .....	66
17.3.2	Doors or covers fixed by screws .....	66
17.3.3	Threaded doors or covers .....	66
18	Lampholders and lamp caps .....	67
18.1	General.....	67
18.2	Device preventing lamps working loose .....	67
18.3	Holders and caps for lamps with cylindrical caps.....	67
18.4	Holders for lamps with threaded caps .....	67
19	Non-metallic enclosures and non-metallic parts of enclosures.....	67
19.1	General.....	67
19.2	Resistance to tracking and creepage distances on internal surfaces of the enclosure walls .....	68
19.3	Supplementary Requirements for type tests .....	68
19.4	Test of erosion by flame .....	68
20	Marking .....	69
20.1	General.....	69
20.2	Caution and warning markings.....	69
20.3	Informative markings .....	70
21	Instructions.....	70
Annex A (normative) Additional requirements for crimped ribbon elements and multiple screen elements of breathing and draining devices .....		71
Annex B (normative) Additional requirements for elements, with non-measurable paths of breathing and draining devices .....		72
B.1	Sintered metal elements.....	72
B.2	Pressed metal wire elements .....	72
B.3	Metal foam elements .....	73
Annex C (normative) Additional requirements for flameproof entry devices.....		74
C.1	General.....	74
C.2	Constructional requirements .....	74
C.2.1	Sealing methods .....	74
C.2.2	Threads Flameproof joints .....	75

C.2.3	Constructional requirements for Ex blanking elements .....	76
C.2.4	Constructional requirements for Ex thread adapters .....	78
C.3	Type tests .....	78
C.3.1	Sealing test.....	78
C.3.2	Test of mechanical strength .....	79
C.3.3	Type tests for Ex blanking elements .....	80
C.3.4	Type tests for Ex thread adapters .....	81
Annex D (normative)	Empty flameproof enclosures as Ex components .....	83
D.1	General.....	83
D.2	Introductory remarks .....	83
D.3	Ex component enclosure requirements .....	83
D.4	Utilization of an Ex component enclosure certificate to prepare an equipment certificate .....	85
D.4.1	Procedure.....	85
D.4.2	Application of the schedule of limitations .....	85
Annex E (normative)	Cells and batteries used in flameproof “d” enclosures .....	86
E.1	Introductory remarks .....	86
E.2	Acceptable electrochemical systems.....	86
E.3	General requirements for cells (or batteries) inside flameproof enclosures.....	87
E.4	Arrangement of safety devices.....	87
E.4.1	Prevention of excessive temperature and cell damage .....	87
E.4.2	Prevention of cell polarity reversal or reverse charging by another cell in the same battery .....	88
E.4.3	Prevention of inadvertent charging of a battery by other voltage sources in the enclosure .....	89
E.5	Recharging of secondary cells inside flameproof enclosures .....	89
E.6	Rating of protection diodes and reliability of protection devices .....	90
Annex F (informative)	Mechanical properties for screws and nuts .....	91
Annex G (normative)	Additional requirements for flameproof enclosures with an internal source of release (containment system) .....	97
G.1	General.....	97
G.2	Release conditions .....	97
G.2.1	No release .....	97
G.2.2	Limited release of a gas or vapour.....	98
G.2.3	Limited release of a liquid .....	98
G.3	Design requirements for the containment system .....	98
G.3.1	General design requirements.....	98
G.3.2	Infallible containment system .....	98
G.3.3	Containment system with a limited release .....	99
G.4	Type tests for the containment system .....	99
G.4.1	Overpressure test .....	99
G.4.2	Leakage test for an infallible containment system .....	99
G.4.3	Leakage test for a containment system with a limited release.....	100
Annex H (normative)	Requirements for machines with flameproof “d” enclosures fed from converters .....	101
H.1	General.....	101
H.2	Construction requirements for bearings .....	101
H.3	Temperature requirements .....	101

Bibliography .....	102
Figure 1 – Example of construction for indirect checking of a flanged Group I flameproof joint.....	23
Figure 2 – Spigot joints .....	24
Figure 3 – Holes in surfaces of flanged joints, example 1 .....	25
Figure 4 – Holes in surfaces of flanged joints, example 2 .....	25
Figure 5 – Holes in surfaces of flanged joints, example 3 .....	25
Figure 6 – Holes in surfaces of spigot joints, example 1 .....	25
Figure 7 – Holes in surfaces of spigot joints, example 2 .....	26
Figure 8 – Holes in surfaces of spigot joints, example 3 .....	26
<b>Figure 9 – Examples of joint constructions.....</b>	<b>27</b>
Figure 10 – Illustration of the requirements concerning gaskets – Example 1 .....	32
Figure 11 – Illustration of the requirements concerning gaskets – Example 2 .....	32
Figure 12 – Illustration of the requirements concerning gaskets – Example 3 .....	32
Figure 13 – Illustration of the requirements concerning gaskets – Example 4 .....	32
Figure 14 – Illustration of the requirements concerning gaskets – Example 5 .....	32
Figure 15 – Illustration of the requirements concerning gaskets – Example 6 .....	32
Figure 16 – Illustration of the requirements concerning gaskets – Example 7 .....	33
Figure 17 – Example of cylindrical joint for shaft of rotating electrical machine .....	36
Figure 18 – Example of labyrinth joint for shaft of rotating electrical machine .....	36
Figure 19 – Example of joint with floating gland for shaft of rotating electrical machine.....	36
Figure 20 – Joints of shaft glands of rotating electrical machines .....	37
Figure 21 – Component test rig for breathing and draining devices .....	41
<b>Figure 22 – Example of possible documentation .....</b>	<b>48</b>
<b>Figure 23 – Example of a regular shaped waveform.....</b>	<b>54</b>
<b>Figure 24 – Example of an irregular shaped waveform.....</b>	<b>54</b>
<b>Figure C.1 – Examples of blanking elements for unused entries.....</b>	<b>77</b>
Figure C.2 – Device for the sealing tests for cable glands.....	79
Figure C.3 – Examples of Ex thread adapters.....	82
Figure E.1 – Fitting of diode arrangement for three cells in series .....	88
Figure E.2 – Fitting of blocking diodes to meet E.4.3 (third example).....	89
<b>Figure G.1 – Flameproof enclosure with containment system .....</b>	<b>97</b>
<b>Table 1 – Number of non-transmission tests for level of protection “da” .....</b>	<b>20</b>
Table 2 – Minimum width of joint and maximum gap for enclosures of Groups I, IIA and IIB .....	29
Table 3 – Minimum width of joint and maximum gap for Group IIC enclosures .....	30
Table 4 – Cylindrical threaded joints.....	31
Table 5 – Taper threaded joints <sup>a, c</sup> .....	31
Table 6 – Conditions for the determination of maximum surface temperature .....	51
<b>Table 7 – Test factors for reduced ambient conditions .....</b>	<b>53</b>
<b>Table 8 – Relative pressures for small equipment.....</b>	<b>55</b>
Table 9 – Reduction in length of a threaded joint for non-transmission test.....	57



Table 10 – Test factors to increase pressure or test gap ( $i_E$ ) .....57

Table 11 – Minimum distance of obstructions from flameproof “d” flange openings .....58

Table 12 – Gas/air mixtures .....59

Table 13 – Static pressures.....64

Table 14 – Text of caution or warning markings .....69

Table 15 – Text of informative markings .....70

Table C.1 – Tightening torque values, metric .....81

Table C.2 – Tightening torque values, NPT .....82

Table E.1 – Acceptable primary cells.....86

Table E.2 – Acceptable secondary cells .....87

Table F.1 – Mechanical properties for screws and nuts .....91

# INTERNATIONAL ELECTROTECHNICAL COMMISSION

## EXPLOSIVE ATMOSPHERES –

### Part 1: Equipment protection by flameproof enclosures “d”

#### FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

**DISCLAIMER**

**This Redline version is not an official IEC Standard and is intended only to provide the user with an indication of what changes have been made to the previous version. Only the current version of the standard is to be considered the official document.**

**This Redline version provides you with a quick and easy way to compare all the changes between this standard and its previous edition. A vertical bar appears in the margin wherever a change has been made. Additions and deletions are displayed in red, with deletions being struck through.**

International Standard IEC 60079-1 has been prepared by IEC technical committee 31: Equipment for explosive atmospheres.

This seventh edition cancels and replaces the sixth edition, published in 2007, and constitutes a technical revision.

The significance of the changes between IEC 60079-1, Edition 7.0 (2014) and IEC 60079-1 Edition 6.0 (2007) (including Corrigendum 1 (2008)), is as listed below:

Explanation of the significance of the changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Normative references (Removal of the edition date from the reference for IEC 60079-0)	2	X		
Requirements for level of protection “da” (Catalytic sensors of portable combustible gas detectors)	4.2		X	
Requirements for level of protection “dc” (“Enclosed break” devices from IEC 60079-15)	4.4, 15.5	X		
Flameproof joints, General requirements (Documentation clarification and examples of corrosion inhibiting grease)	5.1	X		
Flameproof joints, General requirements (Specific Conditions of Use that joints are not intended to be repaired)	5.1		X	
Flameproof joints, General requirements (Electroplating more than 0,008 mm thick)	5.1		X	
Non-threaded joints, Gap ( <i>i</i> ) (Intentional gaps between surface for flanged joints)	5.2.2	X		
Serrated joints (Use and test requirements)	5.2.8	X		
Multi-step joints (Not less than 3 adjacent segments and two path changes)	5.2.9		X	
Minimum width of joint and maximum gap for enclosures of groups IIA and IIB (Maximum gaps for flanged, cylindrical or spigot joints of 9,5 mm minimum width and volume greater than 2 000 cm <sup>3</sup> )	Table 2		X	
Minimum width of joint and maximum gap for enclosures of groups I, IIA, IIB and IIC (ISO 80000-1 for constructional value rounding)	Table 2, Table 3	X		
Cylindrical threaded joints (ISO 965-1 standard in respect of thread form or quality of fit)	Table 4	X		
Taper threaded joints (External and internal thread construction)	Table 5	X		
Cemented joints (Supplemental mechanical means of securement)	6.1.2			C1
Cemented joints (Evaluation criteria if there is leakage)	6.1.2		X	
Fused glass joints (Glass-to-metal joints)	6.2		X	

Explanation of the significance of the changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Thermal tests of breathing and draining devices (Temperature class based on external surface temperature after the 10 min test period)	10.9.3.2	X		
Test of the ability of the breathing and draining device to withstand pressure (Relocated from before thermal tests to after the non-transmission test)	10.9.3.4	X		
Ex component certificate (Service temperature range for non-metallic enclosures per IEC 60079-0)	10.9.4	X		
Fasteners and openings (Relocation of blanking element content to 13.8 and C.2.3)	11	X		
Fasteners and openings, Property class or yield stress (Certificate specific condition of use)	11.3	X		
Fasteners and openings (Openings in the wall of the enclosure)	11.8	X		
Materials (Material limitation in acetylene atmospheres)	12.8			C2
Entries for flameproof enclosures, General (Metric and NPT threaded entries)	13.1	X		
Entries for flameproof enclosures, General (Group I non-threaded joints)	13.1		X	
Entries for flameproof enclosures, Non-threaded holes (Group I application)	13.3		X	
Entries for flameproof enclosures, Cable glands (Group I application)	13.4		X	
Cable glands, Conduit sealing devices (Documentation to facilitate mounting)	13.4,13.5	X		
Plugs and sockets and cable couplers (Load requirement for arc-quenching test)	13.6.4			C3
Bushings (Documentation to facilitate mounting)	13.7	X		
Blanking elements (Relocated from Clause 11)	13.8	X		
Verification and tests (Maximum surface temperature conditions)	Table 6	X		
Type tests (Sequence and number of samples for tests)	15	X		
Determination of explosion pressure, General (Devices that can cause turbulence)	15.2.2.2	X		
Determination of explosion pressure, General (Number of tests for Group IIC)	15.2.2.2	X		
Determination of explosion pressure, General (Pressure pilling for Group IIB)	15.2.2.4	X		

Explanation of the significance of the changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Determination of explosion pressure, General <i>(Equipment marked for a single gas)</i>	15.2.2.5	X		
Overpressure test, General <i>(Low ambient overpressure tests not required)</i>	15.2.3	X		
Overpressure test – First method (static) <i>(3 times option when routine batch testing)</i>	15.2.3.2		X	
Overpressure test – First method (static) <i>(Adjustment for low ambient due to small size of equipment)</i>	15.2.3.2		X	
Overpressure test – Second method (dynamic) <i>(Number of tests to be made)</i>	15.2.3.3	X		
Test for non-transmission of an internal ignition <i>(Clarification regarding grease)</i>	15.3	X		
Reduction in length of a threaded joint for non-transmission test <i>(ISO 965-1 and 965-3 standards in respect of thread form and quality of fit)</i>	Table 9	X		
Test factors to increase pressure or test gap <i>(Group IIC adjustments for elevated ambients)</i>	Table 10	X		
Test for non-transmission of an internal ignition, Groups I, IIA and IIB <i>(Number of tests to be made)</i>	15.3.2.3	X		
Test for non-transmission of an internal ignition, Group IIC testing by increased gap <i>(Number of tests to be made)</i>	15.3.3.2	X		
Test for non-transmission of an internal ignition, Group IIC <i>(Oxygen enrichment of test gases)</i>	15.3.3.4		X	
Thermal tests of enclosures with breathing and draining devices <i>(Temperature class based on external surface temperature after the 10 min test period)</i>	15.4.3.1	X		
Tests for “dc” devices <i>(“Enclosed break” devices from IEC 60079-15)</i>	15.5		X	
Routine tests, General <i>(Adjustment for low ambient due to small size of equipment)</i>	16.1.2		X	
Routine tests, General <i>(Options when second method is chosen)</i>	16.1.3	X		
Routine tests, General <i>(Welded joint inspection options)</i>	16.3		X	
Routine tests, General <i>(Allowance for batch testing)</i>	16.6		X	
Switchgear for Group I <i>(Clarifying need for compliance with EPL Mb types of protection)</i>	17.2.2, 17.2.3	X		
Non-metallic enclosures and non-metallic parts of enclosures, General <i>(Exception for cemented joints)</i>	19.1	X		

Explanation of the significance of the changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Non-metallic enclosures and non-metallic parts of enclosures, Resistance to tracking and creepage distances <i>(Reference to both IEC 60079-7 and or IEC 60079-15)</i>	19.2		X	
Non-metallic enclosures and non-metallic parts of enclosures, Requirements for type tests <i>(Clarification of test sequence)</i>	19.3	X		
Instructions <i>(Indication that repair of flamepaths is not intended)</i>	21		X	
Bushings <i>(Documentation regarding numbers of cores)</i>	C.2.1.4	X		
Bushings <i>(Criteria for non-transmission test)</i>	C.2.1.4	X		
Bushings <i>(Evaluation criteria if there is leakage)</i>	C.2.1.4		X	
Flameproof joints, Threaded joints <i>(Requirement options)</i>	C.2.2.1	X		
Flameproof joints, Non-threaded joints <i>(Group I application)</i>	C.2.2.2		X	
Constructional requirements for Ex blanking elements <i>(Relocated from Clause 11)</i>	C.2.3.1	X		
Constructional requirements for Ex blanking elements <i>(Metric and NPT Ex blanking elements)</i>	C.2.3.2, C.2.3.3	X		
Constructional requirements for Ex blanking elements <i>(Group I non-threaded construction)</i>	C.2.3.4		X	
Sealing test, General <i>(Allowance for re-tightening)</i>	C.3.1.1	X		
Cable glands and conduit sealing devices with sealing ring <i>(Mandrel to be corrosion-resistant metal)</i>	C.3.1.2	X		
Type tests for Ex blanking elements, Torque test <i>(Test-block to be steel)</i>	C.3.3.1	X		
Tightening torque values <i>(Addition of &lt; 16 mm thread size)</i>	Table C.1		X	
Tightening torque values <i>(Addition of NPT thread sizes)</i>	Table C.2		X	
Ex component enclosure requirements <i>(Markings content)</i>	D.3.8			C4
Ex component enclosure requirements <i>(Certificate content)</i>	D.3.10		X	
Utilization of an Ex component enclosure certificate to prepare an equipment certificate, Procedure <i>(Devices that can create significant turbulence)</i>	D.4.1		X	
Acceptable primary cells <i>(Addition of Type B cells)</i>	Table E.1		X	

Explanation of the significance of the changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Acceptable primary cells (Removal of Type T cells)	Table E.1			C5
Acceptable secondary cells (Addition of Lithium type cells)	Table E.2		X	
Prevention of excessive temperature and cell damage (Application of IEC 60079-11 requirement)	E.4.1.2	X		
Prevention of inadvertent charging of a battery by other voltage sources in the enclosure (Construction not requiring additional protection)	E.4.3		X	
Recharging of secondary cells inside flameproof enclosures (Additional battery options)	E.5.1		X	
Introduction of an alternative risk assessment method encompassing equipment protection levels' for Ex equipment (Removal of previous Informative Annex)	Annex G	X		
Additional requirements for Flameproof enclosures with an internal source of release (containment system) (Addition of new Normative Annex)	Annex G		X	
Requirements for machines with flameproof "d" enclosures fed from converters (Addition of new Normative Annex)	Annex H		X	

NOTE The technical changes referred to include the significance of technical changes in the revised IEC Standard, but they do not form an exhaustive list of all modifications from the previous version. More guidance can be found by referring to the Redline Version of the standard.

## Explanations:

### A) Definitions

#### Minor and editorial changes

Clarification  
decrease of technical requirements  
minor technical change  
editorial corrections

These are changes which modify requirements in an editorial or a minor technical way. They include changes of the wording to clarify technical requirements without any technical change, or a reduction in level of existing requirement.

#### Extension

addition of technical options

These are changes which add new or modify existing technical requirements, in a way that new options are given, but without increasing requirements for equipment that was fully compliant with the previous standard. Therefore, these will not have to be considered for products in conformity with the preceding edition.

#### Major technical changes

addition of technical requirements  
increase of technical requirements

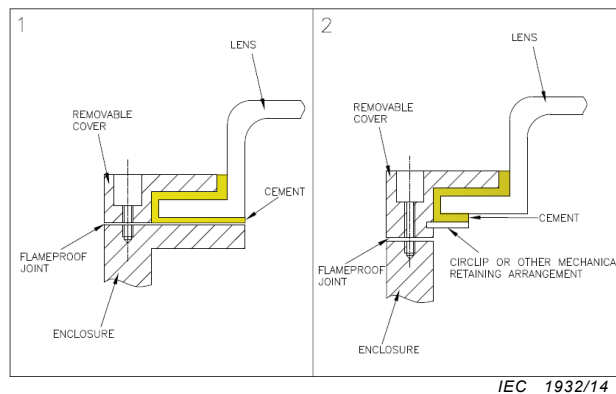
These are changes to technical requirements (addition, increase of the level or removal) made in a way that a product in conformity with the preceding edition will not always be able to fulfil the requirements given in the later edition. These changes have to be

considered for products in conformity with the preceding edition. For these changes additional information is provided in clause B) below.

NOTE These changes represent current technological knowledge. However, these changes should not normally have an influence on equipment already placed on the market.

**B) Information about the background of ‘Major Technical Changes’**

C1 – Supplemental mechanical means of securing the cemented joint shall not be defeated by the opening of doors or covers that are intended to be opened during installation or maintenance. For example, in the images below for a luminaire incorporating a cemented joint between the lens and the enclosure cover, the construction shown in the second image would be in accordance with this requirement, while the construction shown in the first image would not.



- C2 – Addition of material limitations of enclosures of equipment and enclosures of Ex components for external mounting, if constructed of copper or copper alloys, when used in explosive gas atmospheres containing acetylene (12.8).
- C3 – Addition of power factor requirement for evaluating the ability of a plug and socket to remain flameproof during the arc-quenching period while opening a test circuit (13.6.4).
- C4 – Addition of marking requirements for Ex component enclosures, in addition to the requirements for marking of Ex components given in IEC 60079-0 (D.3.8).
- C5 – Removal of Type T cells as acceptable primary cells (Table E.1).

The text of this standard is based on the following documents:

FDIS	Report on voting
31/1111/FDIS	31/1125/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 60079 series, published under the general title *Explosive atmospheres*, can be found on the IEC website.



The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

The contents of the corrigendum of June 2018 and Interpretation sheet of May 2020 have been included in this copy.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

## EXPLOSIVE ATMOSPHERES –

### Part 1: Equipment protection by flameproof enclosures “d”

#### 1 Scope

This part of IEC 60079 contains specific requirements for the construction and testing of electrical equipment with the type of protection flameproof enclosure “d”, intended for use in explosive gas atmospheres.

This standard supplements and modifies the general requirements of IEC 60079-0. Where a requirement of this standard conflicts with a requirement of IEC 60079-0, the requirement of this standard will take precedence.

~~NOTE Equipment protection by flameproof enclosures “d” provides Equipment Protection Level (EPL) Gb. For further information, see Annex G.~~

#### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60061 (all parts), *Lamp caps and holders together with gauges for the control of interchangeability and safety*

~~IEC 60079-0:2004, *Electrical apparatus for explosive gas Explosive atmospheres – Part 0: Equipment – General requirements*~~

~~IEC 60079-1-1, *Electrical apparatus for explosive gas atmospheres – Part 1-1: Flameproof enclosures “d” – Method of test for ascertainment of maximum experimental safe gap*~~

IEC 60079-7, *Explosive atmospheres – Part 7: Equipment protection by increased safety “e”*

IEC 60079-11, *Explosive atmospheres – Part 11: Equipment protection by intrinsic safety “i”*

~~IEC 60079-14:2002, *Electrical apparatus for explosive gas atmospheres – Part 14: Electrical installations in hazardous areas (other than mines)*~~

IEC 60079-15, *Explosive atmospheres – Part 15: Equipment protection by type of protection “n”*

~~IEC 60086-1:2000, *Primary batteries – Part 1: General*~~

~~IEC 60112, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*~~

IEC 60127 (all parts), *Miniature fuses*

~~IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*~~

~~IEC 60623:2001, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Vented nickel-cadmium prismatic rechargeable single cells*~~

~~IEC 60662:1980, High-pressure sodium vapour lamps~~

~~IEC 60695-11-10, Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods~~

~~IEC 61951-1:2003, Secondary cells and batteries containing alkaline or other non-acid electrolytes – Portable sealed rechargeable single cells – Part 1: Nickel-cadmium~~

~~IEC 61951-2:2003, Secondary cells and batteries containing alkaline or other non-acid electrolytes – Portable sealed rechargeable single cells – Part 2: Nickel-metal hydride~~

~~ISO 185:1988, Grey cast iron – Classification~~

ISO 965-1:1998, ISO general-purpose metric screw threads – Tolerances – Part 1: Principles and basic data

ISO 965-3:1998, ISO general-purpose metric screw threads – Tolerances – Part 3: Deviations for constructional screw threads

ISO 2738:1999, Sintered metal materials, excluding hardmetals – Permeable sintered metal materials – Determination of density, oil content and open porosity

~~ISO 3864: 1984, Safety colours and safety signs~~

ISO 4003:1977, Permeable sintered metal materials – Determination of bubble test pore size

ISO 4022:1987, Permeable sintered metal materials – Determination of fluid permeability

ANSI/ASME B1.20.1-1983 (R2001), Pipe threads, general purpose (inch)

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



---

**Explosive atmospheres –  
Part 1: Equipment protection by flameproof enclosures “d”**

**Atmosphères explosives –  
Partie 1: Protection du matériel par enveloppes antidéflagrantes «d»**

INTERNATIONAL ELECTROTECHNICAL COMMISSION

---

**IEC 60079-1**  
Edition 7.0 2014-06

**EXPLOSIVE ATMOSPHERES –**

**Part 1: Equipment protection by flameproof enclosures "d"**

**INTERPRETATION SHEET 1**

This interpretation sheet has been prepared by IEC technical committee 31: Equipment for explosive atmospheres.

The text of this interpretation sheet is based on the following documents:

DISH	Report on voting
31/1536/DISH	31/1542/RVDISH

Full information on the voting for the approval of this interpretation sheet can be found in the report on voting indicated in the above table.

---

**IEC 60079-1:2014 Edition 7.0, Explosive atmospheres – Part 1: Equipment protection by flameproof enclosures "d"**

**Question 1:**

The requirements given in 13.1 of IEC 60079-1:2014 (Edition 7) restrict threaded entries for flameproof enclosures to only metric and NPT. Does this restriction represent a major technical change between IEC 60079-1:2014 (Edition 7) and IEC 60079-1:2007 (Edition 6)?

**Answer 1:**

Yes, the restriction to only metric and NPT regarding threaded entries for flameproof enclosures does represent a major technical change between IEC 60079-1:2014 (Edition 7) and IEC 60079-1:2007 (Edition 6). The requirements given in Clause 13 of IEC 60079-1:2007 (Edition 6) had no such normative restriction, with reference to metric and NPT only as examples of threaded entries for flameproof enclosures.

While IEC 60079-1:2014 (Edition 7) only permits the use of metric and NPT threads for entry into flameproof enclosures, cable glands/conduit entry devices, thread adapters and blanking elements are permitted to use other thread forms (see Annex C of IEC 60079-1:2014 (Edition 7)).

NOTE 1 The intention of the restriction to only metric and NPT regarding threaded entries for flameproof enclosures is to minimize the mismatch of thread forms in enclosure entries.

NOTE 2 In the Foreword of IEC 60079-1:2014 (Edition 7), the table detailing the significance of the changes between IEC 60079-1:2014 (Edition 7) and IEC 60079-1:2007 (Edition 6) mistakenly did not identify this metric and NPT restriction as a major technical change. Unfortunately, the IEC Directives do not permit a corrigendum to be issued to correct errors in non-normative text such as the table detailing the significance of changes.

**Question 2:**

Where a thread adapter is fitted and assessed as a factory-assembled part of the flameproof enclosure, what are the permitted thread forms?

**Answer 2:**

A thread adapter may use thread forms other than metric and NPT, whether as an Ex Equipment thread adapter or as a thread adapter fitted and assessed as a factory-assembled part of the flameproof enclosure (see Annex C of IEC 60079-1:2014 (Edition 7)).

**Question 3:**

Can a blanking element be installed in a thread adapter which is fitted and assessed as a factory-assembled part of the flameproof enclosure?

**Answer 3:**

Yes, the requirements given in Clause 13 of IEC 60079-1:2014 (Edition 7) regarding thread adapters are for separately certified Ex equipment thread adapters, not those fitted and assessed as a factory-assembled part of the flameproof enclosure.

**Question 4:**

What is the required marking when a thread adapter is fitted and assessed as a factory-assembled part of the flameproof enclosure?

**Answer 4:**

Clause 13 of IEC 60079-1:2014 (Edition 7) requires identification of the specific thread type and size of threaded entries into flameproof enclosures. In the case where the thread adapter is fitted and assessed as a factory-assembled part of the flameproof enclosure, the requirement for identification applies to the thread form of the adapter for the field wiring connection.

## CONTENTS

FOREWORD.....	8
1 Scope.....	16
2 Normative references .....	16
3 Terms and definitions .....	17
4 Level of protection (equipment protection level, EPL) .....	19
4.1 General.....	19
4.2 Requirements for level of protection “da” .....	19
4.3 Requirements for level of protection “db” .....	20
4.4 Requirements for level of protection “dc”.....	20
4.4.1 General .....	20
4.4.2 Construction of “dc” devices .....	20
4.4.3 Tests for “dc” devices .....	20
5 Flameproof joints.....	21
5.1 General requirements .....	21
5.2 Non-threaded joints .....	22
5.2.1 Width of joints ( <i>L</i> ) .....	22
5.2.2 Gap ( <i>i</i> ).....	22
5.2.3 Spigot joints.....	22
5.2.4 Holes in joint surfaces .....	23
5.2.5 Conical joints.....	25
5.2.6 Joints with partial cylindrical surfaces (not permitted for Group IIC).....	25
5.2.7 Flanged joints for acetylene atmospheres .....	26
5.2.8 Serrated joints .....	26
5.2.9 Multi-step joints .....	27
5.3 Threaded joints .....	30
5.4 Gaskets (including O-rings).....	30
5.5 Equipment using capillaries .....	32
6 Sealed joints.....	32
6.1 Cemented joints .....	32
6.1.1 General .....	32
6.1.2 Mechanical strength.....	32
6.1.3 Width of cemented joints .....	33
6.2 Fused glass joints .....	33
6.2.1 General .....	33
6.2.2 Width of fused glass joints .....	33
7 Operating rods.....	33
8 Supplementary requirements for shafts and bearings.....	34
8.1 Joints of shafts .....	34
8.1.1 General .....	34
8.1.2 Cylindrical joints .....	34
8.1.3 Labyrinth joints .....	34
8.1.4 Joints with floating glands.....	34
8.2 Bearings .....	36
8.2.1 Sleeve bearings.....	36
8.2.2 Rolling-element bearings .....	36

9	Light-transmitting parts .....	36
10	Breathing and draining devices which form part of a flameproof enclosure .....	37
10.1	General.....	37
10.2	Openings for breathing or draining .....	37
10.3	Composition limits.....	37
10.4	Dimensions .....	37
10.5	Elements with measurable paths.....	37
10.6	Elements with non-measurable paths .....	37
10.7	Removable devices.....	38
10.7.1	General .....	38
10.7.2	Mounting arrangements of the elements .....	38
10.8	Mechanical strength.....	38
10.9	Breathing devices and draining devices when used as Ex components .....	38
10.9.1	General .....	38
10.9.2	Mounting arrangements of the elements and components.....	38
10.9.3	Type tests for breathing and draining devices used as Ex components .....	38
10.9.4	Ex component certificate .....	41
11	Fasteners and openings .....	42
12	Materials .....	43
13	Entries for flameproof enclosures .....	44
13.1	General.....	44
13.2	Threaded holes.....	44
13.3	Non-threaded holes (for Group I only).....	44
13.4	Cable glands.....	45
13.5	Conduit sealing devices .....	45
13.6	Plugs and sockets and cable couplers .....	46
13.7	Bushings.....	47
13.8	Blanking elements.....	47
14	Verification and tests .....	47
15	Type tests .....	48
15.1	General.....	48
15.2	Tests of ability of the enclosure to withstand pressure .....	49
15.2.1	General .....	49
15.2.2	Determination of explosion pressure (reference pressure) .....	49
15.2.3	Overpressure test.....	52
15.3	Test for non-transmission of an internal ignition .....	53
15.3.1	General .....	53
15.3.2	Electrical equipment of Groups I, IIA and IIB.....	55
15.3.3	Electrical equipment of Group IIC .....	56
15.4	Tests of flameproof enclosures with breathing and draining devices .....	57
15.4.1	General .....	57
15.4.2	Tests of ability of the enclosure to withstand pressure .....	57
15.4.3	Thermal tests.....	58
15.4.4	Test for non-transmission of an internal ignition.....	58
15.5	Tests for “dc” devices .....	59
15.5.1	General .....	59
15.5.2	Preparation of “dc” samples.....	59
15.5.3	Test conditions for “dc” devices .....	59



16	Routine tests .....	60
16.1	General.....	60
16.2	Enclosures not incorporating a welded construction .....	61
16.3	Enclosures incorporating a welded construction .....	61
16.4	Bushings not specific to one flameproof enclosure .....	61
16.5	Acceptance criteria .....	61
16.6	Batch testing.....	61
17	Switchgear for Group I.....	62
17.1	General.....	62
17.2	Means of isolation.....	62
17.2.1	General .....	62
17.3	Doors or covers .....	62
17.3.1	Quick-acting doors or covers .....	62
17.3.2	Doors or covers fixed by screws .....	62
17.3.3	Threaded doors or covers.....	63
18	Lampholders and lamp caps .....	63
18.1	General.....	63
18.2	Device preventing lamps working loose.....	63
18.3	Holders and caps for lamps with cylindrical caps.....	63
18.4	Holders for lamps with threaded caps .....	63
19	Non-metallic enclosures and non-metallic parts of enclosures .....	63
19.1	General.....	63
19.2	Resistance to tracking and creepage distances on internal surfaces of the enclosure walls .....	64
19.3	Requirements for type tests .....	64
19.4	Test of erosion by flame.....	64
20	Marking .....	64
20.1	General.....	64
20.2	Caution and warning markings .....	65
20.3	Informative markings.....	65
21	Instructions.....	65
	Annex A (normative) Additional requirements for crimped ribbon elements and multiple screen elements of breathing and draining devices .....	66
	Annex B (normative) Additional requirements for elements, with non-measurable paths of breathing and draining devices .....	67
	B.1 Sintered metal elements .....	67
	B.2 Pressed metal wire elements .....	67
	B.3 Metal foam elements.....	68
	Annex C (normative) Additional requirements for flameproof entry devices .....	69
	C.1 General.....	69
	C.2 Constructional requirements .....	69
	C.2.1 Sealing methods.....	69
	C.2.2 Flameproof joints.....	70
	C.2.3 Constructional requirements for Ex blanking elements .....	71
	C.2.4 Constructional requirements for Ex thread adapters.....	73
	C.3 Type tests .....	73
	C.3.1 Sealing test .....	73
	C.3.2 Test of mechanical strength.....	74

C.3.3	Type tests for Ex blanking elements .....	75
C.3.4	Type tests for Ex thread adapters .....	76
Annex D (normative)	Empty flameproof enclosures as Ex components.....	78
D.1	General.....	78
D.2	Introductory remarks .....	78
D.3	Ex component enclosure requirements.....	78
D.4	Utilization of an Ex component enclosure certificate to prepare an equipment certificate .....	80
D.4.1	Procedure.....	80
D.4.2	Application of the schedule of limitations .....	80
Annex E (normative)	Cells and batteries used in flameproof “d” enclosures .....	81
E.1	Introductory remarks .....	81
E.2	Acceptable electrochemical systems .....	81
E.3	General requirements for cells (or batteries) inside flameproof enclosures .....	82
E.4	Arrangement of safety devices .....	82
E.4.1	Prevention of excessive temperature and cell damage.....	82
E.4.2	Prevention of cell polarity reversal or reverse charging by another cell in the same battery .....	83
E.4.3	Prevention of inadvertent charging of a battery by other voltage sources in the enclosure .....	83
E.5	Recharging of secondary cells inside flameproof enclosures .....	84
E.6	Rating of protection diodes and reliability of protection devices.....	85
Annex F (informative)	Mechanical properties for screws and nuts .....	86
Annex G (normative)	Additional requirements for flameproof enclosures with an internal source of release (containment system) .....	87
G.1	General.....	87
G.2	Release conditions.....	87
G.2.1	No release .....	87
G.2.2	Limited release of a gas or vapour .....	88
G.2.3	Limited release of a liquid.....	88
G.3	Design requirements for the containment system .....	88
G.3.1	General design requirements .....	88
G.3.2	Infallible containment system .....	88
G.3.3	Containment system with a limited release .....	89
G.4	Type tests for the containment system .....	89
G.4.1	Overpressure test .....	89
G.4.2	Leakage test for an infallible containment system .....	89
G.4.3	Leakage test for a containment system with a limited release .....	90
Annex H (normative)	Requirements for machines with flameproof “d” enclosures fed from converters.....	91
H.1	General.....	91
H.2	Construction requirements for bearings.....	91
H.3	Temperature requirements .....	91
Bibliography	.....	92
Figure 1 – Example of construction for indirect checking of a flanged Group I flameproof joint.....		22
Figure 2 – Spigot joints .....		23
Figure 3 – Holes in surfaces of flanged joints, example 1 .....		24

Figure 4 – Holes in surfaces of flanged joints, example 2.....	24
Figure 5 – Holes in surfaces of flanged joints, example 3.....	24
Figure 6 – Holes in surfaces of spigot joints, example 1.....	24
Figure 7 – Holes in surfaces of spigot joints, example 2.....	25
Figure 8 – Holes in surfaces of spigot joints, example 3.....	25
Figure 9 – Examples of joint constructions.....	26
Figure 10 – Illustration of the requirements concerning gaskets – Example 1.....	31
Figure 11 – Illustration of the requirements concerning gaskets – Example 2.....	31
Figure 12 – Illustration of the requirements concerning gaskets – Example 3.....	31
Figure 13 – Illustration of the requirements concerning gaskets – Example 4.....	31
Figure 14 – Illustration of the requirements concerning gaskets – Example 5.....	31
Figure 15 – Illustration of the requirements concerning gaskets – Example 6.....	31
Figure 16 – Illustration of the requirements concerning gaskets – Example 7.....	32
Figure 17 – Example of cylindrical joint for shaft of rotating electrical machine.....	35
Figure 18 – Example of labyrinth joint for shaft of rotating electrical machine.....	35
Figure 19 – Example of joint with floating gland for shaft of rotating electrical machine.....	35
Figure 20 – Joints of shaft glands of rotating electrical machines.....	36
Figure 21 – Component test rig for breathing and draining devices.....	39
Figure 22 – Example of possible documentation.....	45
Figure 23 – Example of a regular shaped waveform.....	51
Figure 24 – Example of an irregular shaped waveform.....	51
Figure C.1 – Examples of blanking elements for unused entries.....	72
Figure C.2 – Device for the sealing tests for cable glands.....	74
Figure C.3 – Examples of Ex thread adapters.....	77
Figure E.1 – Fitting of diode arrangement for three cells in series.....	83
Figure E.2 – Fitting of blocking diodes to meet E.4.3 (third example).....	84
Figure G.1 – Flameproof enclosure with containment system.....	87
Table 1 – Number of non-transmission tests for level of protection “da”.....	20
Table 2 – Minimum width of joint and maximum gap for enclosures of Groups I, IIA and IIB.....	28
Table 3 – Minimum width of joint and maximum gap for Group IIC enclosures.....	29
Table 4 – Cylindrical threaded joints.....	30
Table 5 – Taper threaded joints <sup>a, c</sup> .....	30
Table 6 – Conditions for the determination of maximum surface temperature.....	48
Table 7 – Test factors for reduced ambient conditions.....	50
Table 8 – Relative pressures for small equipment.....	52
Table 9 – Reduction in length of a threaded joint for non-transmission test.....	54
Table 10 – Test factors to increase pressure or test gap ( $i_E$ ).....	54
Table 11 – Minimum distance of obstructions from flameproof “d” flange openings.....	54
Table 12 – Gas/air mixtures.....	55
Table 13 – Static pressures.....	60
Table 14 – Text of caution or warning markings.....	65

Table 15 – Text of informative markings..... 65

Table C.1 – Tightening torque values, metric ..... 76

Table C.2 – Tightening torque values, NPT ..... 77

Table E.1 – Acceptable primary cells ..... 81

Table E.2 – Acceptable secondary cells ..... 82

Table F.1 – Mechanical properties for screws and nuts ..... 86

# INTERNATIONAL ELECTROTECHNICAL COMMISSION

---

## EXPLOSIVE ATMOSPHERES –

### Part 1: Equipment protection by flameproof enclosures “d”

#### FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60079-1 has been prepared by IEC technical committee 31: Equipment for explosive atmospheres.

This seventh edition cancels and replaces the sixth edition, published in 2007, and constitutes a technical revision.

The significance of the changes between IEC 60079-1, Edition 7.0 (2014) and IEC 60079-1 Edition 6.0 (2007) (including Corrigendum 1 (2008)), is as listed below:

Explanation of the significance of the changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Normative references (Removal of the edition date from the reference for IEC 60079-0)	2	X		
Requirements for level of protection “da” (Catalytic sensors of portable combustible gas detectors)	4.2		X	
Requirements for level of protection “dc” (“Enclosed break” devices from IEC 60079-15)	4.4, 15.5	X		
Flameproof joints, General requirements (Documentation clarification and examples of corrosion inhibiting grease)	5.1	X		
Flameproof joints, General requirements (Specific Conditions of Use that joints are not intended to be repaired)	5.1		X	
Flameproof joints, General requirements (Electroplating more than 0,008 mm thick)	5.1		X	
Non-threaded joints, Gap ( <i>i</i> ) (Intentional gaps between surface for flanged joints)	5.2.2	X		
Serrated joints (Use and test requirements)	5.2.8	X		
Multi-step joints (Not less than 3 adjacent segments and two path changes)	5.2.9		X	
Minimum width of joint and maximum gap for enclosures of groups IIA and IIB (Maximum gaps for flanged, cylindrical or spigot joints of 9,5 mm minimum width and volume greater than 2 000 cm <sup>3</sup> )	Table 2		X	
Minimum width of joint and maximum gap for enclosures of groups I, IIA, IIB and IIC (ISO 80000-1 for constructional value rounding)	Table 2, Table 3	X		
Cylindrical threaded joints (ISO 965-1 standard in respect of thread form or quality of fit)	Table 4	X		
Taper threaded joints (External and internal thread construction)	Table 5	X		
Cemented joints (Supplemental mechanical means of securement)	6.1.2			C1
Cemented joints (Evaluation criteria if there is leakage)	6.1.2		X	
Fused glass joints (Glass-to-metal joints)	6.2		X	
Thermal tests of breathing and draining devices (Temperature class based on external surface temperature after the 10 min test period)	10.9.3.2	X		
Test of the ability of the breathing and draining device to withstand pressure (Relocated from before thermal tests to after the non-transmission test)	10.9.3.4	X		

Explanation of the significance of the changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Ex component certificate (Service temperature range for non-metallic enclosures per IEC 60079-0)	10.9.4	X		
Fasteners and openings (Relocation of blanking element content to 13.8 and C.2.3)	11	X		
Fasteners and openings, Property class or yield stress (Certificate specific condition of use)	11.3	X		
Fasteners and openings (Openings in the wall of the enclosure)	11.8	X		
Materials (Material limitation in acetylene atmospheres)	12.8			C2
Entries for flameproof enclosures, General (Metric and NPT threaded entries)	13.1	X		
Entries for flameproof enclosures, General (Group I non-threaded joints)	13.1		X	
Entries for flameproof enclosures, Non-threaded holes (Group I application)	13.3		X	
Entries for flameproof enclosures, Cable glands (Group I application)	13.4		X	
Cable glands, Conduit sealing devices (Documentation to facilitate mounting)	13.4,13.5	X		
Plugs and sockets and cable couplers (Load requirement for arc-quenching test)	13.6.4			C3
Bushings (Documentation to facilitate mounting)	13.7	X		
Blanking elements (Relocated from Clause 11)	13.8	X		
Verification and tests (Maximum surface temperature conditions)	Table 6	X		
Type tests (Sequence and number of samples for tests)	15	X		
Determination of explosion pressure, General (Devices that can cause turbulence)	15.2.2.2	X		
Determination of explosion pressure, General (Number of tests for Group IIC)	15.2.2.2	X		
Determination of explosion pressure, General (Pressure pilling for Group IIB)	15.2.2.4	X		
Determination of explosion pressure, General (Equipment marked for a single gas)	15.2.2.5	X		
Overpressure test, General (Low ambient overpressure tests not required)	15.2.3	X		
Overpressure test – First method (static) (3 times option when routine batch testing)	15.2.3.2		X	

Explanation of the significance of the changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Overpressure test – First method (static) <i>(Adjustment for low ambient due to small size of equipment)</i>	15.2.3.2		X	
Overpressure test – Second method (dynamic) <i>(Number of tests to be made)</i>	15.2.3.3	X		
Test for non-transmission of an internal ignition <i>(Clarification regarding grease)</i>	15.3	X		
Reduction in length of a threaded joint for non-transmission test <i>(ISO 965-1 and 965-3 standards in respect of thread form and quality of fit)</i>	Table 9	X		
Test factors to increase pressure or test gap <i>(Group IIC adjustments for elevated ambients)</i>	Table 10	X		
Test for non-transmission of an internal ignition, Groups I, IIA and IIB <i>(Number of tests to be made)</i>	15.3.2.3	X		
Test for non-transmission of an internal ignition, Group IIC testing by increased gap <i>(Number of tests to be made)</i>	15.3.3.2	X		
Test for non-transmission of an internal ignition, Group IIC <i>(Oxygen enrichment of test gases)</i>	15.3.3.4		X	
Thermal tests of enclosures with breathing and draining devices <i>(Temperature class based on external surface temperature after the 10 min test period)</i>	15.4.3.1	X		
Tests for “dc” devices <i>(“Enclosed break” devices from IEC 60079-15)</i>	15.5		X	
Routine tests, General <i>(Adjustment for low ambient due to small size of equipment)</i>	16.1.2		X	
Routine tests, General <i>(Options when second method is chosen)</i>	16.1.3	X		
Routine tests, General <i>(Welded joint inspection options)</i>	16.3		X	
Routine tests, General <i>(Allowance for batch testing)</i>	16.6		X	
Switchgear for Group I <i>(Clarifying need for compliance with EPL Mb types of protection)</i>	17.2.2, 17.2.3	X		
Non-metallic enclosures and non-metallic parts of enclosures, General <i>(Exception for cemented joints)</i>	19.1	X		
Non-metallic enclosures and non-metallic parts of enclosures, Resistance to tracking and creepage distances <i>(Reference to both IEC 60079-7 and or IEC 60079-15)</i>	19.2		X	
Non-metallic enclosures and non-metallic parts of enclosures, Requirements for type tests <i>(Clarification of test sequence)</i>	19.3	X		



Explanation of the significance of the changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Instructions <i>(Indication that repair of flamepaths is not intended)</i>	21		X	
Bushings <i>(Documentation regarding numbers of cores)</i>	C.2.1.4	X		
Bushings <i>(Criteria for non-transmission test)</i>	C.2.1.4	X		
Bushings <i>(Evaluation criteria if there is leakage)</i>	C.2.1.4		X	
Flameproof joints, Threaded joints <i>(Requirement options)</i>	C.2.2.1	X		
Flameproof joints, Non-threaded joints <i>(Group I application)</i>	C.2.2.2		X	
Constructional requirements for Ex blanking elements <i>(Relocated from Clause 11)</i>	C.2.3.1	X		
Constructional requirements for Ex blanking elements <i>(Metric and NPT Ex blanking elements)</i>	C.2.3.2, C.2.3.3	X		
Constructional requirements for Ex blanking elements <i>(Group I non-threaded construction)</i>	C.2.3.4		X	
Sealing test, General <i>(Allowance for re-tightening)</i>	C.3.1.1	X		
Cable glands and conduit sealing devices with sealing ring <i>(Mandrel to be corrosion-resistant metal)</i>	C.3.1.2	X		
Type tests for Ex blanking elements, Torque test <i>(Test-block to be steel)</i>	C.3.3.1	X		
Tightening torque values <i>(Addition of &lt; 16 mm thread size)</i>	Table C.1		X	
Tightening torque values <i>(Addition of NPT thread sizes)</i>	Table C.2		X	
Ex component enclosure requirements <i>(Markings content)</i>	D.3.8			C4
Ex component enclosure requirements <i>(Certificate content)</i>	D.3.10		X	
Utilization of an Ex component enclosure certificate to prepare an equipment certificate, Procedure <i>(Devices that can create significant turbulence)</i>	D.4.1		X	
Acceptable primary cells <i>(Addition of Type B cells)</i>	Table E.1		X	
Acceptable primary cells <i>(Removal of Type T cells)</i>	Table E.1			C5
Acceptable secondary cells <i>(Addition of Lithium type cells)</i>	Table E.2		X	
Prevention of excessive temperature and cell damage <i>(Application of IEC 60079-11 requirement)</i>	E.4.1.2	X		

Explanation of the significance of the changes	Clause	Type		
		Minor and editorial changes	Extension	Major technical changes
Prevention of inadvertent charging of a battery by other voltage sources in the enclosure <i>(Construction not requiring additional protection)</i>	E.4.3		X	
Recharging of secondary cells inside flameproof enclosures <i>(Additional battery options)</i>	E.5.1		X	
Introduction of an alternative risk assessment method encompassing equipment protection levels' for Ex equipment <i>(Removal of previous Informative Annex)</i>	Annex G	X		
Additional requirements for Flameproof enclosures with an internal source of release (containment system) <i>(Addition of new Normative Annex)</i>	Annex G		X	
Requirements for machines with flameproof "d" enclosures fed from converters <i>(Addition of new Normative Annex)</i>	Annex H		X	

NOTE The technical changes referred to include the significance of technical changes in the revised IEC Standard, but they do not form an exhaustive list of all modifications from the previous version. More guidance can be found by referring to the Redline Version of the standard.

## Explanations:

### A) Definitions

#### Minor and editorial changes

Clarification  
decrease of technical requirements  
minor technical change  
editorial corrections

These are changes which modify requirements in an editorial or a minor technical way. They include changes of the wording to clarify technical requirements without any technical change, or a reduction in level of existing requirement.

#### Extension

addition of technical options

These are changes which add new or modify existing technical requirements, in a way that new options are given, but without increasing requirements for equipment that was fully compliant with the previous standard. Therefore, these will not have to be considered for products in conformity with the preceding edition.

#### Major technical changes

addition of technical requirements  
increase of technical requirements

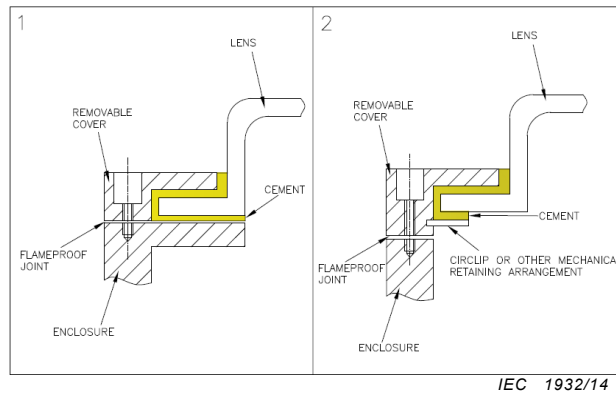
These are changes to technical requirements (addition, increase of the level or removal) made in a way that a product in conformity with the preceding edition will not always be able to fulfil the requirements given in the later edition. These changes have to be considered for products in conformity with the preceding edition. For these changes additional information is provided in clause B) below.

NOTE These changes represent current technological knowledge. However, these changes should not normally have an influence on equipment already placed on the market.

### B) Information about the background of 'Major Technical Changes'

C1 – Supplemental mechanical means of securing the cemented joint shall not be defeated by the opening of doors or covers that are intended to be opened during

installation or maintenance. For example, in the images below for a luminaire incorporating a cemented joint between the lens and the enclosure cover, the construction shown in the second image would be in accordance with this requirement, while the construction shown in the first image would not.



- C2 – Addition of material limitations of enclosures of equipment and enclosures of Ex components for external mounting, if constructed of copper or copper alloys, when used in explosive gas atmospheres containing acetylene (12.8).
- C3 – Addition of power factor requirement for evaluating the ability of a plug and socket to remain flameproof during the arc-quenching period while opening a test circuit (13.6.4).
- C4 – Addition of marking requirements for Ex component enclosures, in addition to the requirements for marking of Ex components given in IEC 60079-0 (D.3.8).
- C5 – Removal of Type T cells as acceptable primary cells (Table E.1).

The text of this standard is based on the following documents:

FDIS	Report on voting
31/1111/FDIS	31/1125/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 60079 series, published under the general title *Explosive atmospheres*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

The contents of the corrigendum of June 2018 and Interpretation sheet of May 2020 have been included in this copy.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

## EXPLOSIVE ATMOSPHERES –

### Part 1: Equipment protection by flameproof enclosures “d”

#### 1 Scope

This part of IEC 60079 contains specific requirements for the construction and testing of electrical equipment with the type of protection flameproof enclosure “d”, intended for use in explosive gas atmospheres.

This standard supplements and modifies the general requirements of IEC 60079-0. Where a requirement of this standard conflicts with a requirement of IEC 60079-0, the requirement of this standard will take precedence.

#### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60061 (all parts), *Lamp caps and holders together with gauges for the control of interchangeability and safety*

IEC 60079-0, *Explosive atmospheres – Part 0: Equipment – General requirements*

IEC 60079-7, *Explosive atmospheres – Part 7: Equipment protection by increased safety “e”*

IEC 60079-11, *Explosive atmospheres – Part 11: Equipment protection by intrinsic safety “i”*

IEC 60079-15, *Explosive atmospheres – Part 15: Equipment protection by type of protection “n”*

IEC 60127 (all parts), *Miniature fuses*

ISO 965-1, *ISO general-purpose metric screw threads – Tolerances – Part 1: Principles and basic data*

ISO 965-3, *ISO general-purpose metric screw threads – Tolerances – Part 3: Deviations for constructional screw threads*

ISO 2738, *Sintered metal materials, excluding hardmetals – Permeable sintered metal materials – Determination of density, oil content and open porosity*

ISO 4003, *Permeable sintered metal materials – Determination of bubble test pore size*

ISO 4022, *Permeable sintered metal materials – Determination of fluid permeability*

ANSI/ASME B1.20.1, *Pipe threads, general purpose (inch)*

## SOMMAIRE

AVANT-PROPOS.....	100
1 Domaine d'application .....	109
2 Références normatives .....	109
3 Termes et définitions .....	110
4 Niveau de protection (Niveau de protection du matériel – Equipment protection level (EPL)) .....	112
4.1 Généralités .....	112
4.2 Exigences applicables au niveau de protection “da” .....	112
4.3 Exigences applicables au niveau de protection “db” .....	113
4.4 Exigences applicables au niveau de protection “dc” .....	113
4.4.1 Généralités .....	113
4.4.2 Construction des dispositifs “dc” .....	113
4.4.3 Essais des dispositifs “dc” .....	114
5 Joints antidéflagrants .....	114
5.1 Exigences générales .....	114
5.2 Joints non filetés .....	115
5.2.1 Longueur de joint (L) .....	115
5.2.2 Interstice (i) .....	115
5.2.3 Joints à emboîtement .....	116
5.2.4 Perçage dans les surfaces des joints .....	117
5.2.5 Joints coniques .....	119
5.2.6 Joints avec des surfaces cylindriques partielles (non admis pour le Groupe IIC) .....	119
5.2.7 Joints à bride pour atmosphères contenant de l'acétylène .....	120
5.2.8 Joints dentelés .....	120
5.2.9 Joints à pas multiples .....	121
5.3 Joints filetés .....	124
5.4 Garnitures (comprenant les bagues toriques) .....	124
5.5 Matériels utilisant des capillaires .....	126
6 Joints scellés .....	126
6.1 Joints scellés (cémentés) .....	126
6.1.1 Généralités .....	126
6.1.2 Résistance mécanique .....	126
6.1.3 Longueur des joints scellés .....	127
6.2 Joints par fusion de verre (de verre fondu) .....	127
6.2.1 Généralités .....	127
6.2.2 Longueur des joints de verre fondu .....	127
7 Tiges de commande .....	128
8 Exigences supplémentaires pour les arbres et paliers .....	128
8.1 Joints des arbres .....	128
8.1.1 Généralités .....	128
8.1.2 Joints cylindriques .....	128
8.1.3 Joints à labyrinthe .....	128
8.1.4 Joints à bagues flottantes .....	128
8.2 Paliers .....	130
8.2.1 Paliers à coussinet .....	130

8.2.2	Paliers à roulements .....	131
9	Parties transparentes ou translucides .....	131
10	Dispositifs de respiration et de drainage faisant partie d'une enveloppe antidéflagrante .....	131
10.1	Généralités .....	131
10.2	Ouvertures pour respiration ou drainage .....	131
10.3	Teneurs limites .....	132
10.4	Dimensions .....	132
10.5	Éléments avec passages mesurables .....	132
10.6	Éléments avec passages non mesurables .....	132
10.7	Dispositifs démontables .....	132
10.7.1	Généralités .....	132
10.7.2	Dispositions de montage des éléments .....	132
10.8	Résistance mécanique .....	133
10.9	Dispositifs de respiration et de drainage utilisés comme composants Ex .....	133
10.9.1	Généralités .....	133
10.9.2	Dispositions de montage des éléments et des composants .....	133
10.9.3	Essais de type des dispositifs de respiration et de drainage utilisés comme composants Ex .....	133
10.9.4	Certificat de composant Ex .....	136
11	Fermetures et ouvertures .....	136
12	Matériaux .....	138
13	Entrées des enveloppes antidéflagrantes .....	139
13.1	Généralités .....	139
13.2	Orifices taraudés .....	139
13.3	Orifices non taraudés (pour le Groupe I uniquement) .....	140
13.4	Entrées de câbles .....	141
13.5	Dispositifs d'étanchéité de conduit .....	141
13.6	Prises de courant et prolongateurs de câble .....	142
13.7	Traversées .....	142
13.8	Éléments d'obturation .....	142
14	Vérification et essais .....	143
15	Essais de type .....	143
15.1	Généralités .....	143
15.2	Essais de tenue à la pression de l'enveloppe .....	144
15.2.1	Généralités .....	144
15.2.2	Détermination de la pression d'explosion (pression de référence) .....	144
15.2.3	Essai de surpression .....	148
15.3	Essai de non-transmission d'une inflammation interne .....	149
15.3.1	Généralités .....	149
15.3.2	Matériels électriques des Groupes I, IIA et IIB .....	151
15.3.3	Matériel électrique du Groupe IIC .....	152
15.4	Essais des enveloppes antidéflagrantes avec dispositifs de respiration et de drainage .....	153
15.4.1	Généralités .....	153
15.4.2	Essais de tenue à la pression de l'enveloppe .....	153
15.4.3	Essais thermiques .....	154
15.4.4	Essai de non-transmission d'une inflammation interne .....	154
15.5	Essais des dispositifs "dc" .....	155

15.5.1	Généralités .....	155
15.5.2	Préparation des échantillons “dc” .....	155
15.5.3	Conditions d’essai des dispositifs “dc” .....	155
16	Essais individuels de série .....	156
16.1	Généralités .....	156
16.2	Enveloppes ne comportant aucune construction soudée .....	157
16.3	Enveloppes comportant une construction soudée .....	157
16.4	Traversées non spécifiques d’une enveloppe antidéflagrante .....	157
16.5	Critères d’acceptation .....	157
16.6	Essais par lots .....	158
17	Appareillage pour le Groupe I .....	158
17.1	Généralités .....	158
17.2	Organes de mise hors tension .....	158
17.2.1	Généralités .....	158
17.3	Portes ou couvercles .....	159
17.3.1	Portes ou couvercles à manœuvre rapide .....	159
17.3.2	Portes ou couvercles fixés par vis .....	159
17.3.3	Portes ou couvercles vissés .....	159
18	Douilles et culots de lampes .....	159
18.1	Généralités .....	159
18.2	Dispositif empêchant l’autodesserrage des lampes .....	159
18.3	Douilles et culots pour lampes à culots cylindriques .....	160
18.4	Douilles pour lampes à culots à vis .....	160
19	Enveloppes non métalliques et parties non métalliques d’enveloppes .....	160
19.1	Généralités .....	160
19.2	Résistance au courant de cheminement et lignes de fuite sur les faces internes des parois des enveloppes .....	160
19.3	Exigences pour les essais de type .....	160
19.4	Essai d’érosion par la flamme .....	161
20	Marquage .....	161
20.1	Généralités .....	161
20.2	Avertissement et marquages .....	161
20.3	Marquages informatifs .....	162
21	Instructions .....	162
Annexe A (normative) Exigences complémentaires pour les éléments du type ruban gaufré et les éléments d’écran multiples des dispositifs de respiration et de drainage .....		163
Annexe B (normative) Exigences complémentaires pour les éléments avec passages non mesurables pour les dispositifs de respiration et de drainage .....		164
B.1	Éléments en métal fritté .....	164
B.2	Éléments en fil métallique pressé .....	164
B.3	Éléments en mousse métallique .....	165
Annexe C (normative) Exigences supplémentaires pour les dispositifs d’entrée antidéflagrants .....		166
C.1	Généralités .....	166
C.2	Exigences de construction .....	166
C.2.1	Méthodes d’étanchéité .....	166
C.2.2	Joints antidéflagrants .....	168
C.2.3	Exigences de construction pour éléments d’obturation Ex .....	168
C.2.4	Exigences de construction pour adaptateurs filetés Ex .....	170



C.3	Essais de type .....	170
C.3.1	Essai d'étanchéité .....	170
C.3.2	Essai de résistance mécanique.....	172
C.3.3	Essais de type pour éléments d'obturation Ex.....	173
C.3.4	Essais de type pour adaptateurs filetés Ex .....	173
Annexe D (normative)	Enveloppes antidéflagrantes vides, comme composants Ex .....	175
D.1	Généralités .....	175
D.2	Remarques introductives.....	175
D.3	Exigences relatives aux enveloppes de composants Ex .....	175
D.4	Utilisation du certificat d'enveloppe de composants Ex pour préparer un certificat de matériel .....	177
D.4.1	Procédure.....	177
D.4.2	Application du programme de limitations.....	177
Annexe E (normative)	Piles et accumulateurs utilisés dans les enveloppes antidéflagrantes «d» .....	178
E.1	Remarques introductives.....	178
E.2	Systèmes électrochimiques admissibles.....	178
E.3	Exigences générales pour piles (ou accumulateurs) à l'intérieur d'enveloppes antidéflagrantes.....	179
E.4	Dispositions des dispositifs de sécurité.....	179
E.4.1	Prévention d'une température excessive et d'un endommagement d'un élément .....	179
E.4.2	Prévention d'inversion de polarité des éléments ou inversion de charge par un autre élément dans la même batterie .....	180
E.4.3	Prévention de charge par inadvertance d'une batterie par d'autres sources de tension présentes dans l'enveloppe .....	181
E.5	Recharge des accumulateurs à l'intérieur des enveloppes antidéflagrantes .....	181
E.6	Caractéristiques assignées des diodes de protection et fiabilité des dispositifs de protection .....	182
Annexe F (informative)	Propriétés mécaniques des vis et écrous.....	183
Annexe G (normative)	Exigences complémentaires applicables aux enveloppes antidéflagrantes avec une source interne de dégagement (système de confinement).....	184
G.1	Généralités .....	184
G.2	Conditions de dégagement.....	185
G.2.1	Pas de dégagement.....	185
G.2.2	Dégagement limité de gaz ou vapeur .....	185
G.2.3	Dégagement limité de liquide.....	185
G.3	Exigences de conception pour le système de confinement .....	185
G.3.1	Exigences générales de conception .....	185
G.3.2	Système de confinement infaillible .....	185
G.3.3	Système de confinement à dégagement limité .....	186
G.4	Essais de type du système de confinement .....	186
G.4.1	Essai de surpression .....	186
G.4.2	Essai d'étanchéité d'un système de confinement infaillible .....	187
G.4.3	Essai d'étanchéité d'un système de confinement à dégagement limité.....	187
Annexe H (normative)	Exigences relatives aux machines avec enveloppes antidéflagrantes "d" alimentées par des convertisseurs.....	188
H.1	Généralités .....	188
H.2	Exigences de construction applicables aux paliers .....	188
H.3	Exigences relatives à la température .....	188

Bibliographie.....	189
Figure 1 – Exemple de construction pour le contrôle indirect d'un joint à bride antidéflagrant du Groupe I .....	116
Figure 2 – Joints à emboîtement.....	117
Figure 3 – Orifices aux surfaces des joints à bride, exemple 1 .....	118
Figure 4 – Orifices aux surfaces des joints à bride, exemple 2 .....	118
Figure 5 – Orifices aux surfaces des joints à bride, exemple 3 .....	118
Figure 6 – Orifices aux surfaces des joints à emboîtement, exemple 1.....	118
Figure 7 – Orifices aux surfaces des joints à emboîtement, exemple 2.....	119
Figure 8 – Orifices aux surfaces des joints à emboîtement, exemple 3.....	119
Figure 9 – Exemples de constructions de joints .....	120
Figure 10 – Illustration des exigences relatives aux garnitures d'étanchéité – Exemple 1....	125
Figure 11 – Illustration des exigences relatives aux garnitures d'étanchéité – Exemple 2....	125
Figure 12 – Illustration des exigences relatives aux garnitures d'étanchéité – Exemple 3....	125
Figure 13 – Illustration des exigences relatives aux garnitures d'étanchéité – Exemple 4....	125
Figure 14 – Illustration des exigences relatives aux garnitures d'étanchéité – Exemple 5....	125
Figure 15 – Illustration des exigences relatives aux garnitures d'étanchéité – Exemple 6....	125
Figure 16 – Illustration des exigences relatives aux garnitures d'étanchéité – Exemple 7...	126
Figure 17 – Exemple de joint cylindrique pour arbre de machine électrique tournante .....	129
Figure 18 – Exemple de joint à labyrinthe pour arbre de machine électrique tournante .....	129
Figure 19 – Exemple de joint à bague flottante pour arbre de machine électrique tournante .....	130
Figure 20 – Joints des traversées d'arbre de machines électriques tournantes .....	130
Figure 21 – Dispositif d'essai pour dispositifs de respiration et de drainage .....	134
Figure 22 – Exemple de documentation possible .....	140
Figure 23 – Exemple d'une forme d'onde régulière .....	147
Figure 24 – Exemple d'une forme d'onde irrégulière .....	147
Figure C.1 – Exemples d'éléments d'obturation pour les entrées non utilisées .....	169
Figure C.2 – Dispositif pour les essais d'étanchéité des entrées de câble .....	171
Figure C.3 – Exemples d'adaptateurs filetés Ex .....	174
Figure E.1 – Montage de diodes pour trois éléments en série .....	180
Figure E.2 – Mise en place de diodes de blocage pour répondre à E.4.3 (troisième exemple).....	181
Figure G.1 – Enveloppe antidéflagrante avec système de confinement .....	184
Tableau 1 – Nombre d'essais de non-transmission pour le niveau de protection “da” .....	113
Tableau 2 – Longueur minimale de joint et interstice maximal des enveloppes des Groupes I, IIA et IIB .....	122
Tableau 3 – Longueur minimale de joint et interstice maximal des enveloppes du Groupe IIC.....	123
Tableau 4 – Joints filetés cylindriques.....	124
Tableau 5 – Joints filetés coniques a, c .....	124
Tableau 6 – Conditions pour la détermination de la température maximale de surface.....	143
Tableau 7 – Facteurs d'essai pour les conditions ambiantes réduites.....	145

Tableau 8 – Pressions relatives pour le matériel de petite taille .....	148
Tableau 9 – Réduction de la longueur d'un joint fileté pour l'essai de non-transmission .....	150
Tableau 10 – Facteurs d'essai pour augmenter la pression ou l'interstice d'essai ( $i_E$ ) .....	150
Tableau 11 – Distance minimale des obstacles pour l'ouverture des brides antidéflagrantes «d» .....	150
Tableau 12 – Mélanges gaz/air .....	151
Tableau 13 – Pressions statiques .....	156
Tableau 14 – Texte des avertissements ou marquages .....	162
Tableau 15 – Texte des marquages informatifs .....	162
Tableau C.1 – Valeurs de couple de serrage, métrique .....	174
Tableau C.2 – Valeurs de couple de serrage, NPT .....	174
Tableau E.1 – Piles admissibles .....	178
Tableau E.2 – Accumulateurs admissibles .....	179
Tableau F.1 – Propriétés mécaniques des vis et écrous .....	183

## COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

## ATMOSPHÈRES EXPLOSIVES –

**Partie 1: Protection du matériel par enveloppes antidéflagrantes «d»**

## AVANT-PROPOS

- 1) La Commission Electrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. A cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
- 2) Les décisions ou accords officiels de l'IEC concernant les questions techniques représentent, dans la mesure du possible, un accord international sur les sujets étudiés, étant donné que les Comités nationaux de l'IEC intéressés sont représentés dans chaque comité d'études.
- 3) Les Publications de l'IEC se présentent sous la forme de recommandations internationales et sont agréées comme telles par les Comités nationaux de l'IEC. Tous les efforts raisonnables sont entrepris afin que l'IEC s'assure de l'exactitude du contenu technique de ses publications; l'IEC ne peut pas être tenue responsable de l'éventuelle mauvaise utilisation ou interprétation qui en est faite par un quelconque utilisateur final.
- 4) Dans le but d'encourager l'uniformité internationale, les Comités nationaux de l'IEC s'engagent, dans toute la mesure possible, à appliquer de façon transparente les Publications de l'IEC dans leurs publications nationales et régionales. Toutes divergences entre toutes Publications de l'IEC et toutes publications nationales ou régionales correspondantes doivent être indiquées en termes clairs dans ces dernières.
- 5) L'IEC elle-même ne fournit aucune attestation de conformité. Des organismes de certification indépendants fournissent des services d'évaluation de conformité et, dans certains secteurs, accèdent aux marques de conformité de l'IEC. L'IEC n'est responsable d'aucun des services effectués par les organismes de certification indépendants.
- 6) Tous les utilisateurs doivent s'assurer qu'ils sont en possession de la dernière édition de cette publication.
- 7) Aucune responsabilité ne doit être imputée à l'IEC, à ses administrateurs, employés, auxiliaires ou mandataires, y compris ses experts particuliers et les membres de ses comités d'études et des Comités nationaux de l'IEC, pour tout préjudice causé en cas de dommages corporels et matériels, ou de tout autre dommage de quelque nature que ce soit, directe ou indirecte, ou pour supporter les coûts (y compris les frais de justice) et les dépenses découlant de la publication ou de l'utilisation de cette Publication de l'IEC ou de toute autre Publication de l'IEC, ou au crédit qui lui est accordé.
- 8) L'attention est attirée sur les références normatives citées dans cette publication. L'utilisation de publications référencées est obligatoire pour une application correcte de la présente publication.
- 9) L'attention est attirée sur le fait que certains des éléments de la présente Publication de l'IEC peuvent faire l'objet de droits de brevet. L'IEC ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de brevets et de ne pas avoir signalé leur existence.

La Norme internationale IEC 60079-1 a été établie par le comité d'études 31 de l'IEC: Équipements pour atmosphères explosives.

Cette septième édition annule et remplace la sixième édition parue en 2007. Cette édition constitue une révision technique.

L'importance des modifications entre l'IEC 60079-1, Édition 7.0 (2014) et l'IEC 60079-1 Édition 6.0 (2007) (y compris le Corrigendum 1 (2008)), est indiquée ci-dessous:

Explication de l'importance des modifications	Article	Type		
		Modifications mineures et rédactionnelles	Extension	Modifications techniques majeures
Références normatives (Suppression de la date d'édition de la référence de l'IEC 60079-0)	2	X		
Exigences applicables au niveau de protection «da» (Capteurs catalytiques pour les détecteurs portables de gaz inflammables)	4.2		X	
Exigences applicables au niveau de protection «dc» (Dispositifs «à coupure enfermée» de l'IEC 60079-15)	4.4, 15.5	X		
Joints antidéflagrants, Exigences générales (Clarification de la documentation et exemples de graisse empêchant la corrosion)	5.1	X		
Joints antidéflagrants, Exigences générales (Conditions spécifiques d'utilisation selon lesquelles les joints ne sont pas destinés à être réparés)	5.1		X	
Joints antidéflagrants, Exigences générales (Dépôt électrolytique sur plus de 0,008 mm d'épaisseur)	5.1		X	
Joints non filetés, Interstice ( <i>i</i> ) (Interstices intentionnels entre les surfaces des joints à bride)	5.2.2	X		
Joints dentelés (Exigences d'utilisation et d'essai)	5.2.8	X		
Joints à pas multiples (Pas moins de 3 segments adjacents et de deux changements de direction du chemin)	5.2.9		X	
Longueur minimale de joint et interstice maximal des enveloppes des groupes IIA et IIB (Interstices maximaux pour les joints à bride, cylindriques ou à emboîtement d'une longueur minimale de 9,5 mm et d'un volume supérieur à 2 000 cm <sup>3</sup> )	Tableau 2		X	
Longueur minimale de joint et interstice maximal des enveloppes des groupes I, IIA, IIB et IIC (ISO 80000-1 pour l'arrondi des valeurs de construction)	Tableau 2, Tableau 3	X		
Joints filetés cylindriques (Norme ISO 965-1 relative au profil de filet ou à la qualité d'ajustement)	Tableau 4	X		
Joints filetés coniques (Construction des filets externes et internes)	Tableau 5	X		
Joints scellés (Dispositifs mécaniques supplémentaires de fixation)	6.1.2			C1
Joints scellés (Critères d'évaluation en cas de fuite)	6.1.2		X	
Joints par fusion de verre (Joints de scellement verre/métal)	6.2		X	

Explication de l'importance des modifications	Article	Type		
		Modifications mineures et rédactionnelles	Extension	Modifications techniques majeures
Essais thermiques des dispositifs de respiration et de drainage (Classe de température basée sur la température de la surface externe après la période d'essai de 10 min)	10.9.3.2	X		
Essai de tenue à la pression des dispositifs de respiration et de drainage (Déplacé de la période avant les essais thermiques pour être placé dans la période après l'essai de non-transmission)	10.9.3.4	X		
Certificat de composant Ex (Gamme de températures de service pour les enveloppes non métalliques selon l'IEC 60079-0)	10.9.4	X		
Fermetures et ouvertures (Affectation du contenu des éléments d'obturation à 13.8 et C.2.3)	11	X		
Fermetures et ouvertures, Classe de propriété ou résistance à la traction (Condition spécifique d'utilisation du Certificat)	11.3	X		
Fermetures et ouvertures (Ouvertures dans la paroi de l'enveloppe)	11.8	X		
Matériaux (Limitation d'utilisation de matériaux dans des atmosphères contenant de l'acétylène)	12.8			C2
Entrées des enveloppes antidéflagrantes, Généralités (Entrées filetées métriques et NPT)	13.1	X		
Entrées des enveloppes antidéflagrantes, Généralités (Joints non filetés du Groupe I)	13.1		X	
Entrées des enveloppes antidéflagrantes, Orifices non taraudés (Application au Groupe I)	13.3		X	
Entrées des enveloppes antidéflagrantes, Entrées de câbles (Application au Groupe I)	13.4		X	
Entrées de câbles, dispositifs d'étanchéité de conduit (Documentation pour faciliter le montage)	13.4,13.5	X		
Prises de courant et prolongateurs (Exigence de charge pour l'essai d'extinction de l'arc)	13.6.4			C3
Traversées (Documentation pour faciliter le montage)	13.7	X		
Éléments d'obturation (Déplacés de l'Article 11)	13.8	X		
Vérification et essais (Conditions pour la détermination de la température maximale de surface)	Tableau 6	X		

Explication de l'importance des modifications	Article	Type		
		Modifications mineures et rédactionnelles	Extension	Modifications techniques majeures
Essais de type <i>(Séquence et nombre d'échantillons pour les essais)</i>	15	X		
Détermination de la pression d'explosion, Généralités <i>(Dispositifs qui peuvent créer de la turbulence)</i>	15.2.2.2	X		
Détermination de la pression d'explosion, Généralités <i>(Nombre d'essais pour le Groupe IIC)</i>	15.2.2.2	X		
Détermination de la pression d'explosion, Généralités <i>(Accumulation de pression pour le Groupe IIB)</i>	15.2.2.4	X		
Détermination de la pression d'explosion, Généralités <i>(Matériel destiné à être utilisé dans un seul gaz)</i>	15.2.2.5	X		
Essai de surpression, Généralités <i>(Essais de surpression à basse température ambiante non exigés)</i>	15.2.3	X		
Essai de surpression – Première méthode (statique) <i>(3 fois – option – en cas d'essais individuels de série par lots)</i>	15.2.3.2		X	
Essai de surpression – Première méthode (statique) <i>(Ajustement par rapport à la basse température ambiante en raison de la petite taille du matériel)</i>	15.2.3.2		X	
Essai de surpression – Deuxième méthode (dynamique) <i>(Nombre d'essais à effectuer)</i>	15.2.3.3	X		
Essai de non-transmission d'une inflammation interne <i>(Clarification portant sur la graisse)</i>	15.3	X		
Réduction de la longueur d'un joint fileté pour l'essai de non-transmission <i>(Les normes ISO 965-1 et 965-3 relatives au profil de filet et à la qualité d'ajustement)</i>	Tableau 9	X		
Facteurs d'essai pour augmenter la pression ou l'interstice d'essai <i>(Ajustements pour le Groupe IIC pour les températures ambiantes élevées)</i>	Tableau 10	X		
Essai de non-transmission d'une inflammation interne, Groupes I, IIA et IIB <i>(Nombre d'essais à effectuer)</i>	15.3.2.3	X		
Essai de non-transmission d'une inflammation interne, Groupe IIC, essai en augmentant l'interstice <i>(Nombre d'essais à effectuer)</i>	15.3.3.2	X		
Essai de non-transmission d'une inflammation interne, Groupe IIC <i>(Enrichissement de l'oxygène des gaz d'essai)</i>	15.3.3.4		X	
Essais thermiques des enveloppes avec dispositifs de respiration et de drainage <i>(Classe de température basée sur la température de la surface externe après la période d'essai de 10 min)</i>	15.4.3.1	X		
Essais des dispositifs "dc" <i>(dispositifs de «à coupure enfermée» de l'IEC 60079-15)</i>	15.5		X	

Explication de l'importance des modifications	Article	Type		
		Modifications mineures et rédactionnelles	Extension	Modifications techniques majeures
Essais individuels de série, Généralités <i>(Ajustement par rapport à la basse température ambiante en raison de la petite taille du matériel)</i>	16.1.2		X	
Essais individuels de série, Généralités <i>(Options lorsque la deuxième méthode est choisie)</i>	16.1.3	X		
Essais individuels de série, Généralités <i>(Options de contrôle des joints soudés)</i>	16.3		X	
Essais individuels de série, Généralités <i>(Tolérance des essais par lots)</i>	16.6		X	
Appareillage pour le Groupe I <i>(Nécessité de clarification de la conformité aux modes de protection EPL Mb)</i>	17.2.2, 17.2.3	X		
Enveloppes non métalliques et parties non métalliques d'enveloppes, Généralités <i>(sauf les joints scellés)</i>	19.1	X		
Enveloppes non métalliques et parties non métalliques d'enveloppes, Résistance au courant de cheminement et lignes de fuite <i>(Référence à l'IEC 60079-7 et/ou à l'IEC 60079-15)</i>	19.2		X	
Enveloppes non métalliques et parties non métalliques d'enveloppes, Exigences pour les essais de type <i>(Clarification de la séquence d'essais)</i>	19.3	X		
Instructions <i>(Indication selon laquelle la réparation des passages de flamme n'est pas prévue)</i>	21		X	
Traversées <i>(Documentation relative au nombre de conducteurs)</i>	C.2.1.4	X		
Traversées <i>(Critères de l'essai de non-transmission)</i>	C.2.1.4	X		
Traversées <i>(Critères d'évaluation en cas de fuite)</i>	C.2.1.4		X	
Joints antidéflagrants, Joints taraudés, <i>(Options d'exigences)</i>	C.2.2.1	X		
Joints antidéflagrants, Joints non taraudés, <i>(Application au Groupe I)</i>	C.2.2.2		X	
Exigences de construction pour éléments d'obturation Ex <i>(Déplacées de l'Article 11)</i>	C.2.3.1	X		
Exigences de construction pour éléments d'obturation Ex <i>(Éléments d'obturation Ex métriques et NPT)</i>	C.2.3.2, C.2.3.3	X		
Exigences de construction pour éléments d'obturation Ex <i>(Construction non fileté pour le Groupe I)</i>	C.2.3.4		X	
Essai d'étanchéité, Généralités <i>(Tolérance pour le resserrage)</i>	C.3.1.1	X		



Explication de l'importance des modifications	Article	Type		
		Modifications mineures et rédactionnelles	Extension	Modifications techniques majeures
Entrées de câble et dispositifs d'étanchéité de conduit avec bagues d'étanchéité <i>(Mandrin en métal résistant à la corrosion)</i>	C.3.1.2	X		
Essais de type pour éléments d'obturation Ex, Essais de torsion <i>(Bloc d'essai en acier)</i>	C.3.3.1	X		
Valeurs de couple de serrage <i>(Ajout de dimension du filetage &lt; 16 mm)</i>	Tableau C.1		X	
Valeurs de couple de serrage <i>(Ajout des dimensions de filetage NPT)</i>	Tableau C.2		X	
Exigences des enveloppes de composants Ex <i>(Contenu des marquages)</i>	D.3.8			C4
Exigences des enveloppes de composants Ex <i>(Contenu du certificat)</i>	D.3.10		X	
Utilisation du certificat d'enveloppe de composants Ex pour préparer un certificat de matériel, Procédure <i>(Dispositifs qui peuvent créer une turbulence importante)</i>	D.4.1		X	
Piles admissibles <i>(Ajout des piles de Type B)</i>	Tableau E.1		X	
Piles admissibles <i>(Suppression des piles de Type T)</i>	Tableau E.1			C5
Accumulateurs acceptables <i>(Ajout des piles au lithium)</i>	Tableau E.2		X	
Prévention d'une température excessive et d'un endommagement d'un élément <i>(Application des exigences de l'IEC 60079-11)</i>	E.4.1.2	X		
Prévention de charge par inadvertance d'une batterie par d'autres sources de tension présentes dans l'enveloppe <i>(Construction ne nécessitant aucune protection supplémentaire)</i>	E.4.3		X	
Recharge des accumulateurs à l'intérieur des enveloppes antidéflagrantes <i>(Options de batterie supplémentaire)</i>	E.5.1		X	
Introduction d'une autre méthode d'évaluation des risques englobant des niveaux de protection du matériel (EPL) pour le matériel Ex <i>(Suppression de l'ancienne Annexe Informative)</i>	Annexe G	X		
Exigences complémentaires applicables aux enveloppes antidéflagrantes avec une source interne de dégagement (système de confinement) <i>(Ajout d'une nouvelle Annexe Normative)</i>	Annexe G		X	
Exigences relatives aux machines avec enveloppes antidéflagrantes "d" alimentées par des convertisseurs <i>(Ajout d'une nouvelle Annexe Normative)</i>	Annexe H		X	

NOTE Les modifications techniques dont il est fait mention indiquent l'importance des modifications techniques contenues dans la version révisée de la norme IEC, mais elles ne constituent pas une liste exhaustive de toutes les modifications par rapport à la version précédente. D'autres lignes directrices sont données dans la Version de base de la norme.

## **Explications:**

### **A) Définitions**

#### **Modifications mineures et rédactionnelles**

Clarification

réduction des exigences techniques

modifications techniques mineures

corrections d'ordre rédactionnel

Ces modifications portent sur les exigences et sont de nature rédactionnelle ou technique mineure. Elles comprennent des modifications de formulation destinées à clarifier les exigences techniques sans apporter de modification technique ni réduire le niveau actuel de l'exigence.

#### **Extension**

ajout d'options techniques

Ces modifications ajoutent de nouvelles exigences techniques ou modifient les exigences techniques existantes, de façon à fournir de nouvelles options, mais sans augmenter les niveaux d'exigences pour tout matériel qui était totalement conforme à la précédente Norme. Ces modifications ne sont donc pas à prendre en compte dans le cas de produits conformes à la précédente édition.

#### **Modifications techniques majeures**

ajout d'exigences techniques

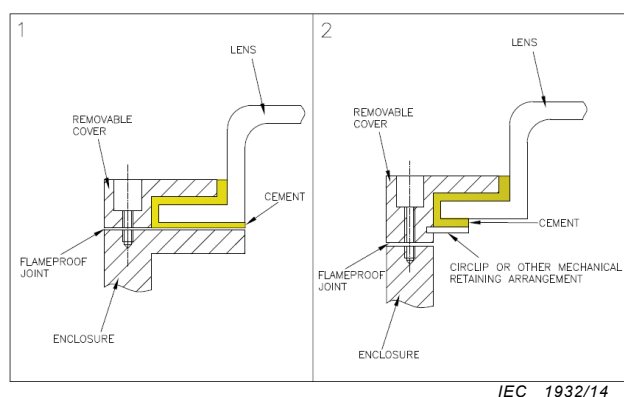
augmentation des exigences techniques

Ces modifications sont apportées aux exigences techniques (ajout, augmentation du niveau ou suppression) de telle façon qu'un produit conforme à la précédente édition n'a pas toujours la capacité de satisfaire aux exigences indiquées dans la dernière édition. Ces modifications sont à prendre en compte dans le cas de produits conformes à la précédente édition. L'Article B) ci-dessous fournit des informations supplémentaires sur ces modifications.

NOTE Ces modifications reflètent les connaissances technologiques actuelles. Cependant, il convient que ces modifications n'aient généralement pas d'influence sur le matériel déjà sur le marché.

### **B) Informations sur l'origine des "Modifications techniques majeures"**

C1 – Les dispositifs mécaniques supplémentaires permettant de fixer le joint scellé ne doivent pas être rendus inopérants du fait de l'ouverture de portes ou de couvercles destinés à être ouverts pendant l'installation ou la maintenance. Par exemple, dans les images ci-dessous montrant un luminaire comportant un joint scellé entre la lentille et le couvercle de l'enveloppe, la construction montrée dans la deuxième image est conforme à cette exigence, alors que la construction montrée dans la première image ne l'est pas.



### Légende

Anglais	Français
Lens	Lentille
Removable cover	Couvercle démontable
Cement	Scellement
Flameproof joint	Joint antidéflagrant
Enclosure	Enveloppe
Circlip or other mechanical retaining arrangement	Circlip ou autre dispositif de fixation mécanique

- C2 – Ajout de limitations de matériaux des enveloppes du matériel et des enveloppes de composants Ex pour montage externe, si elles sont en cuivre ou alliages de cuivre, lorsqu'utilisées dans les atmosphères explosives gazeuses contenant de l'acétylène (12.8).
- C3 – Ajout d'exigences de facteur de puissance pour l'évaluation de la tenue d'une prise de courant à demeurer antidéflagrante pendant la période d'extinction d'arc à l'ouverture d'un circuit d'essai (13.6.4).
- C4 – Ajout d'exigences de marquage relatives aux enveloppes de composants Ex, en plus des exigences de marquage des composants Ex spécifiées dans l'IEC 60079-0 (D.3.8).
- C5 – Suppression des piles de type T en tant que piles admissibles (Tableau E.1).

Le texte de cette norme est issu des documents suivants:

FDIS	Rapport de vote
31/1111/FDIS	31/1125/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette norme.

Cette publication a été rédigée selon les Directives ISO/IEC, Partie 2.

Une liste de toutes les parties de la série IEC 60079, publiées sous le titre général *Atmosphères explosives*, peut être consultée sur le site web de l'IEC.

Le comité a décidé que le contenu de cette publication ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous "<http://webstore.iec.ch>" dans les données relatives à la publication recherchée. A cette date, la publication sera

- reconduite,
- supprimée,
- remplacée par une édition révisée, ou
- amendée.

Le contenu du corrigendum de juin 2018 et la feuille d'interprétation de mai 2020 (seulement en anglais) a été pris en considération dans cet exemplaire.

**IMPORTANT – Le logo "colour inside" qui se trouve sur la page de couverture de cette publication indique qu'elle contient des couleurs qui sont considérées comme utiles à une bonne compréhension de son contenu. Les utilisateurs devraient, par conséquent, imprimer cette publication en utilisant une imprimante couleur.**

## ATMOSPHÈRES EXPLOSIVES –

### Partie 1: Protection du matériel par enveloppes antidéflagrantes «d»

#### 1 Domaine d'application

La présente partie de l'IEC 60079 contient les exigences spécifiques de construction et d'essai du matériel électrique à enveloppe antidéflagrante, mode de protection «d», destiné à être utilisé dans les atmosphères explosives gazeuses.

La présente Norme complète et modifie les exigences générales de l'IEC 60079-0. Lorsqu'une exigence de cette norme entre en conflit avec une exigence de l'IEC 60079-0, l'exigence de la présente norme prévaut.

#### 2 Références normatives

Les documents suivants sont cités en référence de manière normative, en intégralité ou en partie, dans le présent document et sont indispensables pour son application. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60061 (toutes les parties), *Culots de lampes et douilles ainsi que calibres pour le contrôle de l'interchangeabilité et de la sécurité*

IEC 60079-0, *Atmosphères explosives – Partie 0: Matériel – Exigences générales*

IEC 60079-7, *Atmosphères explosives – Partie 7: Protection de l'équipement par sécurité augmentée «e»*

IEC 60079-11, *Atmosphères explosives – Partie 11: Protection de l'équipement par sécurité intrinsèque «i»*

IEC 60079-15, *Atmosphères explosives – Partie 15: Protection du matériel par mode de protection «n»*

IEC 60127 (toutes les parties), *Coupe-circuit miniatures*

ISO 965-1, *Filetages métriques ISO pour usages généraux – Tolérances – Partie 1: Principes et données fondamentales*

ISO 965-3, *Filetages métriques ISO pour usages généraux – Tolérances – Partie 3: Écarts pour filetages de construction*

ISO 2738, *Matériaux métalliques frittés, à l'exclusion des métaux durs – Matériaux métalliques frittés perméables – Détermination de la masse volumique, de la teneur en huile et de la porosité ouverte*

ISO 4003, *Matériaux en métal fritté perméable – Détermination de la dimension des pores – Méthode bulloscopique*

ISO 4022, *Matériaux métalliques frittés perméables – Détermination de la perméabilité aux fluides*

ANSI/ASME B1.20.1, *Pipe threads, general purpose (inch)*